Potomac Basin
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J. Dotson

Children play at Baker Park in Frederick, Md. Scenes such as this were common sights in many areas of the watershed, after Tropical Storm Isabel and a subsequent storm drenched the region, causing floods.

Isabel Leaves Mark on Potomac Basin

Tropical Storm Isabel's brush with the Potomac Basin in September left much damage in its wake. The most apparent damage was structural. The level of environmental damage from the tropical storm, which followed months of very wet weather, may not be known for some time. Many are comparing this storm with the remnants of Hurricane Agnes, which furiously struck the Chesapeake Bay region in 1972. The physical damage resulting from the recent storm may be greater than that of Agnes. Agnes flooded the region with huge amounts of rain, where Isabel's effects were caused by smaller amounts of rain coupled with winds that caused large tidal surges, pushing bay water against the western shore and up into the tributaries.

In human terms, the effects of the storm were dramatic, particularly in the tidewater areas of the basin. Many basin residents lost electrical power for several days to a week or more. Some areas of the watershed, reeling from the tropical storm, were subjected to further insult from torrential rains that followed several days later. While the tropical storm-related effects were limited to high winds, several inches of rain, and tidal surges on September 18 and 19, a severe storm on September 22 caused flooding in some areas upstream of Washington. For the tidewater Potomac, the hurricane's winds brought tides and surges that devastated shoreline areas. Towns along the lower Potomac, such as Saint Mary's, Md., suffered from damages in the millions of dollars. Colonial Beach, Va., lost its town pier, waterfront restaurants and some marina facilities, that will take some

Our mission is to enhance, protect and conserve the water and associated land resources of the Potomac River and its tributaries through regional and interstate cooperation.

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time to restore. "There was considerably more damage [to Colonial Beach] than from Hurricane Agnes," said Kirby Carpenter, executive secretary of the Potomac River Fisheries Commission, headquartered in the beleaguered town. Called a week after the storm, the bi-state fisheries agency had just gotten power restored to its office.

Though somewhat less drastic, waterfront communities all along the tidal Potomac were dealing with damage from tidal surges from the river's mouth through Alexandria and Washington, D.C.

Flooding, overloads from high inflows, and power outages damaged some wastewater treatment plants along the river, resulting in discharges of partially treated or untreated sewage. Power outages also brought down some pumping stations.

Some water utilities also experienced problems. The Fairfax County Water Authority, which serves more than a million people in the Virginia portion of the metropolitan area, lost power for about 13 hours, leaving some customers without water for a short period. The possibility of stormwater entering the system and contaminating supplies led the utility to issue a temporary boil-water alert to its customers as a precaution.

Sections of the C&O Canal were closed as fallen trees resulted in downed power lines and damage to some structures. Many hiker-biker campsites were closed, and pump handles were removed from wells at campsites as a precaution. The park's many volunteers helped park staff to quickly reopen many areas of the park.

In terms of the river and its tributaries, things could have been much worse if the storm had not moved quickly, limiting the amount of rain to several inches. In many cases, the insults that the storm heaped on the river were in addition to the effects of the year-long above-average flows of the Potomac and its tributaries, and the cool, cloudy, and wet weather conditions that have greatly influenced the status of aquatic systems in the watershed.

While the storm brought high river flows to the upper parts of the basin, the area experienced only minor flooding. Further downstream, along the C&O Canal, Maryland Department of Natural Resources (DNR) fisheries staff, with help from the park staff and members of the Potomac River Smallmouth Club patrolled the towpath to check for fish trapped in the canal. The groups found few fish, however. "We dodged a bullet," said Ed Enamait, a DNR fisheries manager. Unlike the storms and flooding in 1996, the hurricane's effects came at a time when submerged vegetation was already established for the year, spawning was over, and fish were getting ready for winter. He noted that areas where the river overflowed it banks and into the canal did so only in a minor way. "The

flooding we experienced [in that section of the river] was a part of the normal cycle, something that happens routinely" for the river, and he did not expect severe problems for fish stocks because of the storm.

Enamait added that he had found evidence of a fair to good hatch of smallmouth bass in the Potomac this year. The hatch came later than normal in the year due to the wet, cloudy conditions that held down water temperatures in the spring, and that this year's young fish were somewhat smaller than they should be. Because the fish are about a month or more behind a normal growth schedule, they will enter winter on the small side, and survival rates could be reduced. Fish populations in the freshwater Potomac "are very resilient," Enamait noted, and thought that not only the winter, but conditions next spring will be key to population health next year.

Ken Penrod, a Potomac fishing guide for decades, and author of several books on fishing the Potomac River, agreed. Penrod, a keen and frequent observer of conditions on the upper tidal and freshwater Potomac, noted that the storm left additional silt and minor damage to some grass beds in the river, which were already smaller from the summer's wet, cloudy weather. Penrod added that bass fishing both before and after the hurricane was quite good this year.

While sport fisherman with trailerable boats have quickly returned to the river, watermen are facing a different reality. Watermen working pound nets and other large traps that are difficult to move found many of them missing or destroyed. An already broken oyster fishery on the Potomac may have taken one insult too many. "We will certainly lose oyster beds in the upper part of the river," said Carpenter. Sediment and the deluge of fresh water that descended on the upriver beds will further stress a fishery already reeling from disease. Oyster harvest on the Potomac last year totaled about 2,000 bushels, at or near a record low. The wet weather and storm have further decimated the Potomac's oyster beds, which most watermen currently have little interest in working. The PRFC received only "a handful," of license applications for the current season, which began on October 1. Watermen with the permits haven't bothered to try working the beds, and remain focused on their crab pots instead, Carpenter added. The oyster season on the Potomac runs through March 31.

Although preliminary assessment of

Wet Weather and Storms: Effects on the Potomac

Before the damage wrought by Tropical Storm Isabel, the Potomac basin has been in one of the wettest cycles in memory, preceded by several years of drought. Some of the effects of the weather on the basin's waterways includes:

Nutrient loadings: Nitrogen and phosphorus pollution are a major threat to the river and Chesapeake Bay. These fertilizers wash off the land with rainfall, and promote algae blooms, which block sunlight from submerged aquatic vegetation. Die-offs of blooms fall to the bottom, where bacteria use dissolved oxygen to break them down. Depleted oxygen levels are another major problem.

Sediment: Also washes off the agricutural and disturbed lands into waterways, where it blocks sunlight, carries nutrients, and smothers shellfish and aquatic plants on the river bottom.

Wastewater and Combined Sewer Overflows: Flooding and power outages can disrupt wastewater treatment plants, resulting in discharges of raw or partially treated sewage laden with bacteria that can harm aquatic organisms and create human health hazards. In parts of older, urban collection systems, sanitary and stormwater sewers are combined in a single pipe. Precipitation can overload the system, which discharges its mix of sewage and stormwater to the river instead of traveling to a treatment plant.

Storm Surges: Storms in the upper basin can send large slugs of fresh water downstream, reducing salinity and changing temperatures (in addition to carrying sediment and nutrient loads). Severe storm flows can physically displace fish and plants downstream. On the tidal river, the winds of tropical storms can send surges of saltier bay water up into freshwater areas. Surges that come in conjunction with high tides are the most destructive. Both can harm creatures in the estuary that flourish within certain ranges of temperature and salinity.

J. Kiang

At high flows, not much "falls" is visible at Great Falls.

aquatic vegetation after the storm are encouraging, the storm came at the end of a year that was not particularly favorable for growth of aquatic plants. The drought conditions of the several previous years saw large growth of vegetation in the river. The wet, cool, cloudy conditions of 2003 showed a decrease in plant coverage in the upper tidal Potomac around Washington, D.C., noted Nancy Rybicki, a scientist for the U.S. Geological Survey. Stands of plants further downriver did relatively well, although the growing season got a late start. Some researchers are predicting a decline in submerged aquatic vegetation for next season, because of the heavy nutrient and sediment loads deposited to the river.

Under other circumstances, the nutrient loads would continue to feed blooms of blue-green algae that have affected the parts of the lower Potomac River during the summer. Blooms of blue-green algae, once a common summer occurrence in the upper estuary, are indicative of heavy nutrient loads. The blooms can sometimes be toxic to aquatic life, block sunlight from other plants, and can create zones of low dissolved oxygen as they decompose. Algal levels were higher in the river during the past year, when the wet weather brought a flush of nutrients after several years of drought conditions.

The rush of fresh water coming downstream, and cooler water temperatures have eradicated the blooms, at least for now. Monitoring after the storm showed a strong decrease in the algae levels from Piscataway Bay to the route 301 Bridge, noted Peter Tango, a natural resources planner for the Maryland Department of Natural Resources. The increased salinities from the storm surge, along with cooler water temperatures and cloudiness "have created poorer conditions for the blue-green summer species of algae," Tango said.

The storm's effects (along with the previous season of extremely wet weather) may not be known for some time. Large amounts of nutrients have been washing into the river for months, capped by the hurricane. "Its' hard to say what will happen in the spring," Tango said. He added that winter and spring weather, both in precipitation and temperature, will help determine what will happen as far as next year's algae blooms and dissolved oxygen levels. For example, strong blooms of winter species of algae that later die off could add a lot of nutrients to the river bottom. As water temperatures warm in the spring, the bacteria that will break down the material can cause dissolved oxygen problems as well as providing the nutrients to fuel algae blooms, if conditions are right.

Tango and other researchers are very interested in comparing what happens in the river as a result of these wet weather conditions compared with the drought conditions of a year before. "Comparing the extremes [of drought conditions versus extremely wet conditions] should be very interesting," Tango said.

In the meantime, anglers have returned to the river to report good catches of many species of fish. Crabbing has improved slightly, and large numbers of jellyfish have been reported in some of the smaller creeks nearest the bay. It is said that nature abhors a vacuum, and the vacuum that was the storm seems to have stirred up the ecosystem, at least for a while.

ICPRB Assists in Sewage Spill Response

Heavy rains caused a sewage spill at the Hagerstown, Md., wastewater treatment plant on September 4-5, which emptied about 60 million gallons of raw and partially treated sewage into Antietam Creek. The plant previously discharged sewage in February 2002, when industrial solvents caused the failure of bacterial processes used to treat the water (see January/ February 2002 *Reporter*). The ICPRB responded by running a computer model designed to help downstream water utilities cope with any possible effects on their operations. Rain storms that bring a deluge of water in a short amount of time can cause power outages and easily overwhelm wastewater treatment facilities.

The spill began just after midnight on September 4, initially dumping about 40

million gallons of partially treated and untreated sewage into the creek because of a power outage, which lasted for about 24 hours. After the initial spill, the plant continued to discharge until mid-day September 5, according to Donnie Barton, plant superintendent of the Hagerstown wastewater treatment facility. Barton noted that Hagerstown had received about 4.5 inches of rain in less than two hours, which overwhelmed the pumps meant to divert only 24 million gallons of runoff per day. Barton said, "the pumps were receiving about 30-40 million gallons of stormwater," which was more than they could handle. The loss of power made matters worse.

Erik Hagen, deputy director of the ICPRB Section for Cooperative Water Supply Operation, said that the Toxic Spill Model was used to track the movement of the spill as it made its way downstream. Information from the spill model was used to give water suppliers warning of when the spill might arrive at the intakes, as well as when the spill would have completely passed downstream. The spill model is calibrated for use in slightly lower and steadier flows. The flows were not far beyond the limits of the model so the information "could be interpreted in this case with some caution," according to Hagen. To help confirm the model, Hagen used fecal coliform and *Escherichia coli* bacteria data taken daily by Frederick County Department of Public Works to compare the data to the peaks and trailing edge of the model data. "We are pleased that the model accurately produced travel times despite the flows being higher than those for which the model was

calibrated," said Hagen. Frederick County will try to increase monitoring more after spills in the future to help refine the model. "We appreciate Frederick County's willingness to help make the model a more accurate tool," said Hagen.

In addition to the sewage spill, downstream creeks, streams, and rivers were inundated with unsteady flow rates, making it challenging to estimate the spill's impacts. High flows during the event diluted the spill and quickly moved it downstream. Alex McNamee of the Maryland Department of Environment said that the effluent was left untreated, but that the amount of water in Antietam Creek would have diluted it somewhat. McNamee said that water suppliers were instructed to shut off their intakes if possible based on the Toxic Spill Model time estimates and to treat water with more chlorine to eliminate the higher bacteria levels that generally come with sewage spills. Local health departments notified citizens by posting signs along Antietam Creek and the Potomac warning recreational users of the spill.

For more information about sewage spills, please visit *www.mde.state.md.us/Programs/WaterPrograms/cso_sso.asp*.

New ICPRB Officers elected for 2003-2004; Annual Report Available

The ICPRB Commissioners, representing the basin jurisdictions, elected new officers for the year at the agency's annual meeting, held in Gettysburg, Pa., on September 8-9.

At the recommendation of the nominating committee, J. Winston Porter, who represents the federal government, was elected chairman. He succeeds William I. Plank of Pennsylvania. Gloria Taylor Fisher of Virginia was elected vice chairman.

Porter, appointed to ICPRB by the Bush Administration, is a leading environmental and management consultant, and president of the Waste Policy Center in Leesburg, Va., a private consulting and research firm. He is the author of many reports, speeches and op-ed articles on such topics as waste management, litter control, agricultural biotechnology, federal facilities site remediation, and streamlining of Superfund cleanups. His career has included service as U.S. Environmental Protection Agency Assistant Administrator for Solid Waste and Emergency Response from 1985 to 1989, and as a manager for Bechtel Corporation.

Gloria Taylor Fisher, a Virginia commissioner, is a civil engineer in private practice with extensive international experience in environmental issues. She has served as director of the Northern Virginia Soil and Water Conservation District and is an officer of the Engineering Standards Review Committee of Fairfax county. She also has lent her expertise to Virginia's Chesapeake Bay effort, working with the Local Government Advisory Committee and as a liaison to the Scientific and Technical Advisory Committee of the Chesapeake Bay Program.

During the meeting, ICPRB's annual accomplishment report was released, highlighting the agency's achievements during 2002. Printed as a brochure, the report renders a quick look at the commission's major areas of activity during the year, as well as providing a snapshot of the basin's status. Copies of the brochure are available from ICPRB, or can be accessed on our website.

Potomac Watershed Forum Brings Virginia's Potomac Together

August 8th marked the third annual Potomac Watershed Forum, a gathering of environmental constituents from Virginia government, federal government, regional bodies, and concerned citizens, who met to discuss issues within Virginia's Potomac watershed and plans to alleviate problems in the basin. The ICPRB, along with Virginia's Soil and Water Conservation Districts, the Potomac Watershed Roundtable, the Virginia Department of Conservation and Recreation, Friends of the Potomac, and the Virginia Cooperative Extension, sponsored the event. The major topics of the day included water quality and supply issues, Total Maximum Daily Loads (TMDLs), and tributary strategies. Representatives from Virginia's environmental agencies as well as the U.S. Environmental Protection Agency (EPA)

Watching the River Flow

A tropical storm capped a very wet 2003 water year, which logged the second-highest Potomac flows since record-keeping began 67 years ago, according to the U.S. Geological Survey. The water year runs from October 1 through September 30, when groundwater levels are usually lowest and high demands for plants and human consumption decrease. Groundwater recharge begins in October with the onset of the dormant season. Streamflows, directly related to groundwater, follow the same yearly pattern.

In August, daily flow of the Potomac River measured near Washington, D.C., averaged about 5 billion gallons per day (bgd), or 189 percent of the average August flow of about 2.7 bgd. Daily extremes for the month ranged from a low of about 3.3 bgd on August 25 to a high of about 9.4 bgd on August 14. Above-normal precipitation increased the already high groundwater levels and streamflows. Water withdrawn for drinking use in the metropolitan area averaged about 423 million gallons per day (mgd), approximately 20 percent less than in August 2002. Freshwater inflow to the Chesapeake Bay averaged about 49.1 bgd, or about 225 percent of the long-term average. The Potomac contributed about 14 percent of the total.

September 2003 set 40-year groundwater highs throughout the basin. Two to three times the normal precipitation for September contributed to the high groundwater levels and streamflows for the month. The daily streamflow average was 21.3 bgd, about 888 percent above normal flow of 2.2 bgd. Daily extremes ranged from a low of about 3.1 bgd on September 1 to a high of about 97.3 bgd on September 21. Withdrawals for drinking water use in the metropolitan area averaged about 416 mgd, about eight percent less than September 2002. Freshwater inflow to the Chesapeake Bay averaged about 86.9 bgd, the third highest flow for the month of September since the record began. The Potomac contributed 30 percent of the total.

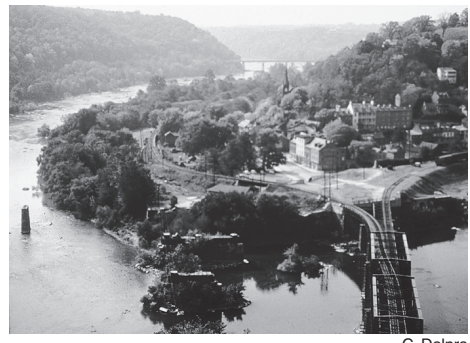
During the 2003 water year, the Potomac flow has been above average since February and exceeded flood stage during Hurricane Isabel, according to the U.S. Geological Survey. The Potomac's flow averaged about 15.2 bgd, or 186 percent of normal flow for the 2003 water year, second-highest on the record. The high daily flow for the year was 97.3 bgd on September 21. The low daily flow for the year was 1.3 bgd on October 1. For more information, visit *md.water.usgs.gov/publications/press_release/current/*.

were on hand to lead the discussions.

David Paylor, Deputy Secretary of Natural Resources and Virginia's Drought Coordinator, started off the forum with a discussion about the significance of drought and its effects on Virginia's portion of the Potomac basin. Record minimum flows were recorded in August 2002 for the Shenandoah watershed and near record flows were recorded for the rest of the basin. Forest fires broke out across the state due to the dry conditions and more than 6,200 well replacement permits were issued state-wide, many in the Potomac basin.

Paylor initiated a drought assessment and response plan to better prepare for droughts in the future. The assessment separated Virginia into drought evaluation regions. In the future, an early warning system using the four preliminary indicators of precipitation patterns, streamflows, groundwater levels, and reservoir levels will more precisely target shortfalls in water supply for each evaluation region. The response plan also includes providing technical support to the public from the existing Virginia Drought Monitoring Task Force. Paylor's main task as Drought Coordinator is to keep communication lines open and constant for quick response. Through better water supply planning and early warning indicators, Paylor foresees a natural resiliency built into the system to save counties from the water supply quagmire experienced in the summer of 2002.

River levels, precipitation, and water supply all directly relate to water quality, a topic of equal importance at this year's Forum. Donald Welsh, Regional Administrator for the EPA's Region III, spoke about the importance of TMDLs and their role in restoring the Potomac. TMDLs are the amount of a particular pollutant that a particular stream, lake, estuary, or other waterbody can handle without violating state water quality standards, according to EPA's TMDL factsheet. The TMDL process, which includes identifying waterways that do not meet water quality standards, establishing TMDLs, and finally developing strategies to reduce the pollution, allows the state to look across the watershed and develop partnerships for implementing strategies. At a time when EPA is often seen as a group of "jack-booted storm-trooper thugs," according to Welsh, it is important to have partners that are not seen as such a threat to get on-the-ground monitoring done. "It's a victory for all of us if the environment gets better," said Welsh. He went on to emphasize that it was not about how many fines were issued, how many regulations were used to solve environmental problems, or arguing with partners. Instead, Welsh remained centered on the idea that our resources should be spent protecting the environment and that partnerships are an important part of the process.



C. Dalpra

The Shenandoah River (left) flows many miles through Virginia before meeting the Potomac at Harpers Ferry, W.Va. The Shenandoah is the Potomac's largest tributary.

The TMDLs for impaired waters must be completed by 2010 to help reach the Chesapeake Bay Program goals for the Potomac basin. To date, 35 TMDLs for the Potomac watershed have been completed and 40 will be sent to the EPA for approval in April of 2004. Alan Pollack, Director of Water Programs for Virginia's Department of Environmental Quality, noted that the main cause for river and stream impairments is pathogens. Nutrients continue to be the main cause of impairments in estuaries. The TMDL strategies will help to reduce individual pollutants for each waterway that is impacted.

On a more regional level, tributary strategies were developed to restore and protect aquatic habitat for living resources, reduce and cap nutrient and sediment loads, and identify control actions that are practical, cost effective and equitable. Jack Frye, director of Virginia's Division of Soil and Water Conservation, discussed the basis for Potomac tributary strategies. The creation of the Chesapeake Bay 2000 Agreement was a major reason for developing tributary strategies to help deal with the Potomac's issues. This year, new Chesapeake Bay Program goals for the Potomac watershed were released, spawning the need to revise the current tributary strategies. Frye believes that nutrient and sediment reductions needed to meet the new goals will come from agricultural practices, improved wastewater treatment, better stormwater management, and low impact development.

Following presentations, forum participants were asked to make comments and pose questions to the speakers. Many of the concerns related to funding for initiatives to clean the Potomac. Cost efficiency and sources of funding were the two most discussed topics, with differing opinions about which projects were more in need of funding. Another topic of concern was atmospheric deposition of nitrogen into the bay. Nitrogen from the atmosphere is

considered to be a major source of nitrogen loading to the bay. Attendees questioned how it is being addressed with current programs, and if the new Chesapeake Bay Program nitrogen-reduction goals for the Potomac can be met without considering atmospheric nitrogen. According to the Chesapeake Bay Program, about 30% of the nitrogen loading to the watershed comes from the air. Most of the loading, of course, falls on land, where a portion reaches waterways through runoff. The forum's discussion session encouraged participants to think about future actions that need to be taken to meet the Chesapeake Bay Program goals for the Potomac basin and what partnerships may develop to accomplish them. The forum gave citizens the opportunity to network with local and federal government representatives and discuss concerns about water quality in the Potomac basin.

C&O Canal Park Superintendent Retires

Douglas D. Faris, who has served as the superintendent of the C&O Canal National Historic Park since 1994, recently retired from the Park Service. The C&O Canal park runs alongside the Potomac for more than 183 miles, from Washington, D.C., to Cumberland, Md., and is visited by millions of people each year.

Faris led the park, a resource that has helped protect and preserve the Potomac River, with effective education and innovation. He deftly worked to raise consciousness and funding that helped repair the park after devastating floods in 1996. He enlarged and used the parks strong volunteer base to accomplish the task. He also sought to enhance the park as a regional resource, and promoted the park as an active entity in conservation and other environmental efforts.

Under his guidance, park staff worked with ICPRB on a number of projects, including the production of a set of Potomac River/C&O Canal maps covering the upper half of the area, and in helping promote shad restoration and other projects.

The commission presented a resolution of appreciation to Faris at a recent retirement ceremony. "Faris has been a great ally in our work for the river," noted ICPRB Executive Director Joseph Hoffman. "His efforts will be missed."

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